SOUND TRANSIT

HCT Planning

Sound Transit 2.1

Technical Memorandum
Summary Needs Assessment

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Sound Transit

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1. Introduction

Sound Transit is pursuing the expansion of the current high capacity transit system that is under construction and in operation as defined under *Sound Move*. This document presents a high-level assessment of the needs driving the extension of the existing high capacity transit system toward full build-out of ST's Regional Transit Long-Range Plan. This Needs Statement will cover both regional and corridor specific factors influencing the expansion of the system and lay out customer-focused and performance-based indicators of incremental achievement of regional transportation system goals and objectives. Specifically, the regional needs will include discussion of the following criteria for evaluating the proposed system expansion:

- Conformity with formally-adopted regional plans
- Mobility
- Environmental benefits
- Economic benefits

This document will also describe the following corridor specific needs:

- Existing and future travel patterns
- Land-use and demographic distributions
- Congestion.

1.1 Historical Overview

The development of high capacity transportation (HCT) systems within the central Puget Sound region has been guided over the years by federal and state legislation, as well as by state, regional and local plans and policies. The purpose of these overarching directives is to build an integrated HCT system that increases the people-carrying capacity of the region's most congested travel corridors, supports the region's growth management policies, ensures a vital economy and protects the region's environment.

The Legislature defined a HCT system in RCW 81.104.015 (1) as:

> "a system of public transportation services within an urbanized region *operating principally on exclusive rights of way*, and the supporting services and facilities necessary to implement such a system, including interim express services and high occupancy vehicle lanes, which taken as a whole, provides a substantially higher level of passenger capacity, speed, and service frequency than traditional public transportation systems operating principally in general purpose roadways."

The following table presents an 18-year history of planning for HCT in the Puget Sound region.

Table 1: High Capacity Transit in the Central Puget Sound Region—Development Chronology

1990	**The Washington State Growth Management Act (Chapter 36.70A RCW) and High Capacity Transit (HCT) Act (Chapter 81.104 RCW) are approved**, enabling the creation of a regional rapid transit system for the central Puget Sound region. The HCT Act calls for transit agencies to plan, build and operate an HCT system within the region's most heavily used travel corridors.
	The Puget Sound Regional Council (PSRC) adopted VISION 2020, the region's growth and transportation strategy. Transportation policy recommendations include references to the development of an HCT system.
1991	**The Joint Regional Policy Committee (JRPC) formed as a mandate of the HCT Act**.
1992	**The State Legislature enabled the formation of a Regional Transit Authority** with the approval of RCW Chapter 81.112, which provided the legal basis for the Puget Sound region to create one local agency for planning and implementing an HCT system.
1993	**The JRPC's Environmental Impact Statement (EIS) was completed**. The EIS evaluated options for improving regional mobility needs through 2020, including enhanced transportation system management (TSM) and transportation demand management (TDM), busways and rail alternatives. The Rail/TSM alternative in the EIS became the preferred alternative.
	The JRPC recommended that a Regional Transit Authority should serve King, Pierce and Snohomish Counties. The JRPC prepared and adopted a regional HCT system plan and transmitted that plan to the King, Pierce, and Snohomish county councils to consider whether to form a regional transit authority (RTA) to implement the plan.
	King, Pierce, and Snohomish Counties formed the Central Puget Sound Regional Transit Authority (RTA).
1995	**Voters in King, Snohomish and Pierce counties rejected the RTA's $6.7 billion plan** (1995 dollars) to create a tri- county transportation system made up of commuter rail, light rail, express buses and bus facilities.
	The Puget Sound Regional Council (PSRC) adopted the 1995 Update to VISION 2020 and the Metropolitan Transportation Plan (MTP) in compliance with the requirements of the federal Intermodal Surface Transportation Efficiency Act (ISTEA), the Clean Air Act Amendments of 1990 and the state Growth Management Act. HCT remains a major component of the MTP.
1996	**The revised *Sound Move* plan was approved by King, Snohomish and Pierce County voters** with a price tag of $3.9 billion (1995 dollars). This comprehensive regional transit plan contained nearly 100 separate but interrelated capital and service projects that included: high-occupancy vehicle system improvements, ST Express bus routes, Sounder commuter rail and Link light rail. *Sound Move* was the first implementation phase of a larger, long-range system.
	Concurrent with the adoption of *Sound Move*, the Sound Transit Board adopted the Regional Transit Long-Range Vision to keep the whole regional system in the public's eye. The Vision provided a general blueprint for reaching the region's long-term high capacity transit goals. The Vision addressed the opportunity for additional HCT investments, including rail extensions in future phases, and it identified possible additional HCT corridors and potential rail lines.
2001	**The PSRC adopted Destination 2030 as the functional transportation element of VISION 2020**, to serve as the region's MTP. Sound Transit's Long-Range Vision and the *Sound Move* plan are key components of the PSRC's MTP.
2004	**A draft supplemental Environmental Impact Statement (SEIS) for an updated Long-Range Vision (now Plan) was released to update the 1993 EIS**. The SEIS analyzed the environmental impacts of potential action alternatives in the context of new information and existing environmental conditions and provided plan-level environmental analysis to inform regional transit project decisions. This Draft SEIS analyzed a No Action alternative and the Long-Range Plan alternative (with options).
2005	**Sound Transit released the Final SEIS and unanimously adopted the updated Regional Transit Long-Range Plan**. The 1996 Vision was updated to reflect extensive analysis of the region's future growth, and it details how a regional transit system might best accommodate that growth.
	Sound Transit initiates the Sound Transit Phase II (ST2) system planning process.
2006	The **Washington State Legislature** acts to require the ST2 Plan to be **presented to the voters as a combined package** that includes the **Regional Transportation Investment District (RTID) roads plan**.
2007	**Sound Transit adopts ST2** as the second phase of the regional high capacity transit system.
	ST2, combined with the RTID "BluePrint for Progress,"as the Proposition 1 Roads & Transit package fails to receive approval by the region's voters in the November 2007 election.

2. Planning Criteria

The following criteria, organized by the four major performance areas, will be used to evaluate the system expansion proposals considered by Sound Transit.

2.1 Conformity with formally-adopted regional plans

- Clearly and concisely articulating travel market sector needs and the investment benefits toward serving those needs
- Providing regional facilities and services that are a logical extension of *Sound Move* and a significant step toward the full build-out of ST's Regional Transit Long-Range Plan
- Demonstrating consistency with regional plans and policies as documented in Vision 2040 and Destination 2030, as well as the High Capacity Transportation Systems Act (RCW 81.104)
- Providing regional (not local) facilities and services
- Involving the public and key stakeholders in decision making

2.2 Mobility

- Providing citizens with improved and expanded alternatives to automobile and traffic congestion
- Linking the region's designated urban centers
- Focusing HCT implementation in high density corridors and operate principally in exclusive rights-of-way to maximize transit travel time advantages and provide significant reliability benefits
- Preserving transit right-of-way where possible to maintain future mobility and HCT implementation options
- Balancing regional, corridor and subarea needs through an appropriate mix of ST Express, Sounder commuter rail, Link light rail, and other available HCT technologies

2.3 Environmental benefits

- Developing HCT in accordance with sustainability initiatives that support regional efforts to reduce greenhouse gas emissions and protect and enhance the natural environment in the central Puget Sound region
- Supporting city and county measures enacted to manage growth and reduce automobile use in major centers
- Prioritizing investment in communities with supportive land use plans that take advantage of transit oriented development benefits

- Encouraging and supporting future development inside urban growth boundaries
- Returning benefits in balance with subarea population, employment and needs

2.4 Economic benefits

- Increasing the value of *Sound Move* investment in projects and services through continued complimentary investments that realize the full benefits of existing services
- Supporting the regional economy and preserving a high quality of life through the expansion of mobility options and support of land use decisions that promote Transit Oriented Development (TOD) within walking distance of HCT stations
- Avoiding competitive, duplicative services through the continued expansion of HCT and trunk services that facilitate the redeployment of current resources to new and developing markets across the region
- Returning benefits in balance with subarea population, employment and mobility needs
- Focusing investment within the RTA district

3. Growth

Puget Sound currently has a population of approximately 3.3 million residents. This is an increase of about 2 million people since 1960. Greater than fifty percent of this expansion can be attributed to net migration to the region. Forecasts of future population predict that number will increase to 4.2 million residents in the region by 2030. When the forecasted growth is disaggregated slightly the growth patterns are more apparent. While employment continues to show a strong propensity to concentrate in Seattle and Eastside King County areas, the population growth is more evenly spread throughout the region. This contributes to transportation difficulties as increasing number of trips will be made to regional employment centers constrained by geography and existing facilities that limit the ability to expand the existing roadway system.

Table 2 – Forecasted Population Growth

	2000	2010	2020	2030	2000 to 2030
King	1,737,000	1,893,000 (9.0%)	2,075,000 (9.6%)	2,235,000 (7.7%)	28.7%
Pierce	701,000	810,000 (15.5%)	917,000 (13.2%)	1,008,000 (9.9%)	43.8%
Snohomish	606,000	734,000 (21.1%)	862,000 (17.4%)	967,000 (12.2%)	59.6%
	3,044,000	3,437,000 (12.9%)	3,854,000 (12.1%)	4,210,000 (9.2%)	38.3%

Table 3 – Forecasted Employment Growth

	2000	2010	2020	2030	2000 to 2030
King	1,196,000	1,311,000 (9.6%)	1,498,000 (14.3%)	1,665,000 (11.1%)	39.2%
Pierce	262,000	283,000 (8.0%	324,000 (14.5%)	367,000 (13.3%)	40.1%
Snohomish	218,000	249,000 (14.2%)	299,000 (20.1%)	350,000 (17.1%)	60.6%
	1,676,000	1,843,000 (10.0%)	2,121,000 (15.1%)	2,382,000 (12.3%)	42.1%

Table 4 – Forecasted Employment Growth by Selected Areas

Area	2000	2030	Additional Jobs
Eastside King	307,100	481,200	174,100 (56.7%)
Green River	196,400	279,600	83,200 (42.4%)
King Other	8,000	13,200	5,200 (65.0%)
SE King	28,000	39,900	11,900 (42.5%)
Seattle Area	540,400	708,300	167,900 (31.1%)
Shoreline Area	17,800	20,100	2,300 (12.9%)
SW King	98,300	122,400	24,100 (24.5%)
Pierce Other	67,300	115,100	47,800 (71.0%)
SW Pierce	65,800	74,600	8,800 (13.4%)
Tacoma Area	117,700	160,500	42,800 (36.4%)
Everett Area	118,800	182,400	63,600 (53.5%)
NW Snohomish	7,000	14,000	7,000 (100.0%)
Snohomish Other	11,500	17,800	6,300 (54.8%)
SW Snohomish	80,300	135,900	55,600 (69.2%)
Kitsap County	85,000	116,000	31,000 (36%)

Table 5 – Forecasted Population Growth by Selected Areas

Area	2000	2030	Additional Residents
Eastside King	430,900	591,200	160,300 (37.2%)
Green River	166,400	209,700	43,300 (26.0%)
King Other	44,200	71,000	26,800 (60.6%)
SE King	211,900	325,300	113,400 (53.5%)
Seattle Area	563,300	672,400	109,100 (19.4%)
Shoreline Area	67,100	70,300	3,200 (4.8%)
SW King	253,300	294,900	41,600 (16.4%)
Pierce Other	315,600	526,400	210,800 (66.8%)
SW Pierce	131,600	150,600	19,000 (14.4%)
Tacoma Area	197,400	247,900	50,500 (25.6%)
Everett Area	218,300	352,800	134,500 (61.6%)
NW Snohomish	38,100	62,100	24,000 (63.0%)
Snohomish Other	67,900	107,500	39,600 (58.3%)
SW Snohomish	281,700	444,500	162,800 (57.8%)
Kitsap County	232,000	315,000	83,000 (36%)

In studying employment and growth forecasts it is interesting to note that employment growth will outpace population growth in nearly all selected areas, with SE King, SW Pierce, and Snohomish Other being the exceptions. This indicates travel demand will grow in trips to and between these areas, adding additional pressure on existing infrastructure and services. The greatest disparity in employment and population growth is between NW Snohomish (37.0%), Eastside King (19.5%), and Green River (16.3%). In order of actual forecasted increases, Eastside King, Seattle Area, and Green River lead in terms of additional jobs, while the top three selected areas in terms of additional residents, in order, are Pierce Other, SW Snohomish, and Eastside King.

Figure 1 – Forecasted Population Growth 2000 – 2030

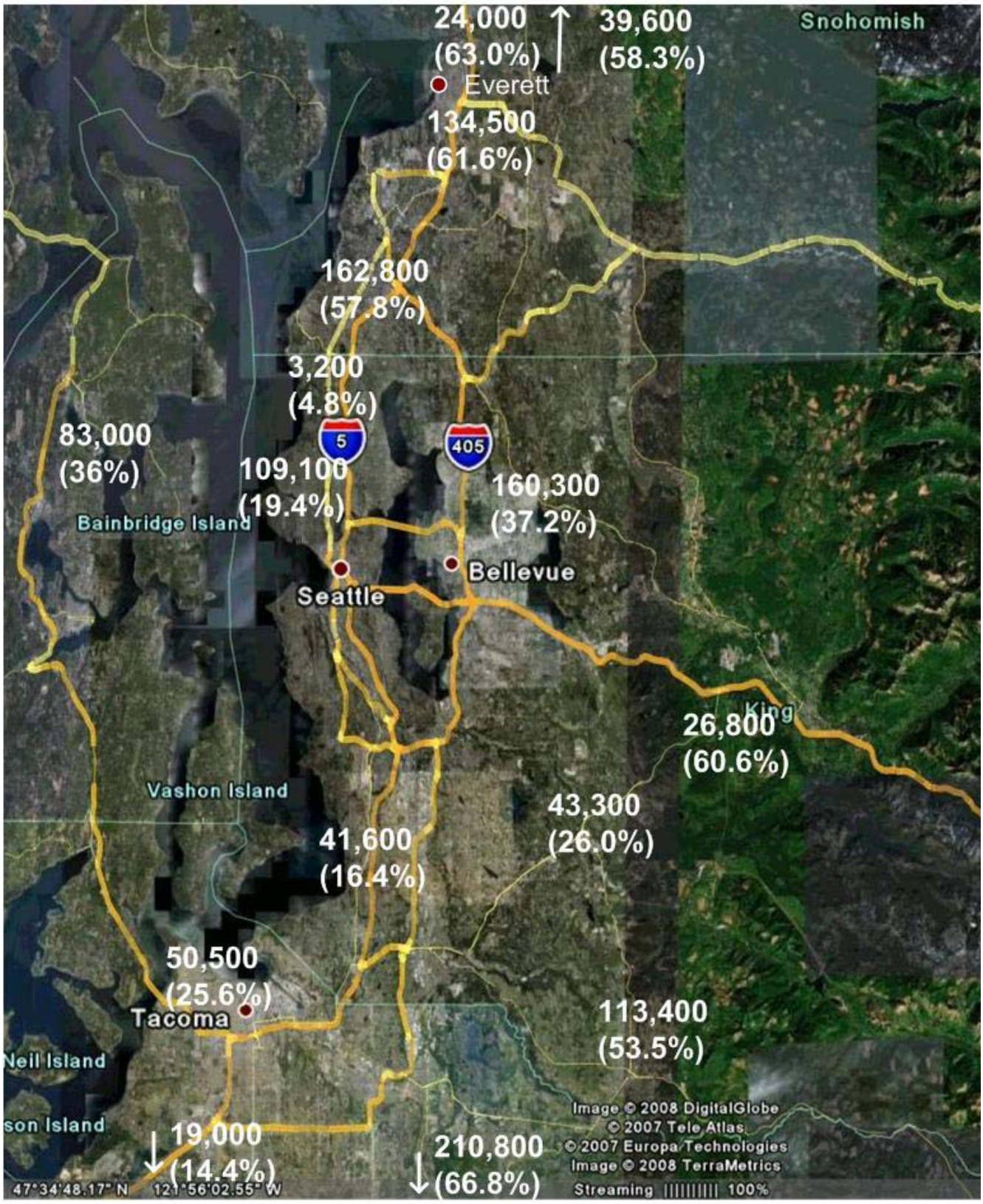
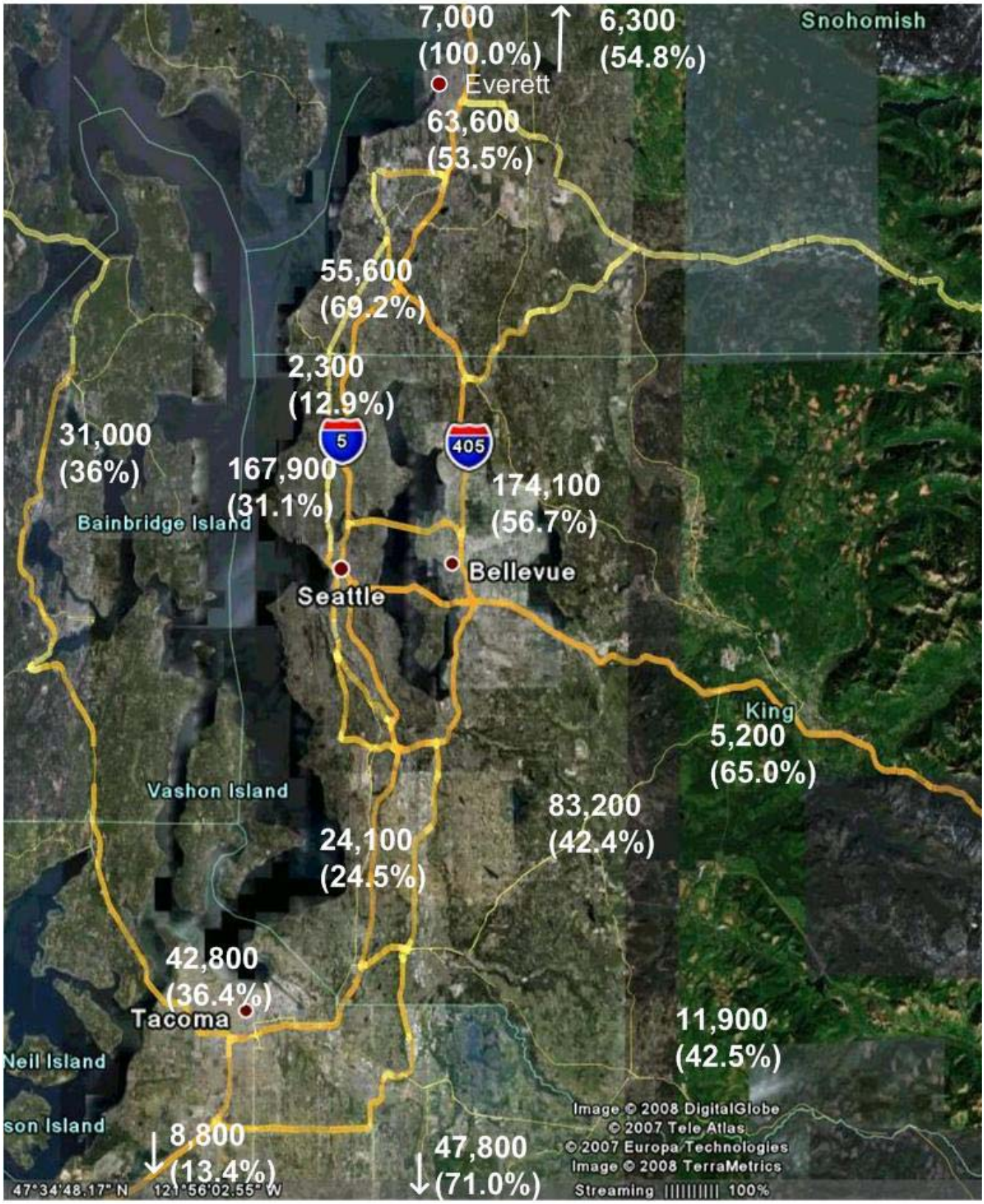


Figure 2 – Forecasted Employment Growth 2000 – 2030



4. Travel Patterns

4.1 General Travel Patterns

Geography, existing transportation facilities and housing prices are all forces that shape the general travel patterns in the region. One of the primary drivers in the creation of the original Vision 2020 and its more recent update Vision 2040 was the understanding of the need to link transportation planning and land use decisions. An example of the types of patterns that exist in the region is the percentage of work trips that cross county lines. Table 7 shows the percentage of people from each county that either work in their home county or commute to a neighboring county.

Table 7 Cross-County Commute Patterns

	% Work in Home County	% Work Outside Home County
King	94%	6%
Pierce	73%	27%
Snohomish	64%	36%

Source: PSRC – Destination 2030 Update, Growth and Transportation Part II, September, 2007

As the largest county in terms of population and employment, King County is attracting many trips from neighboring Pierce and Snohomish counties. Commute trips especially tend to flow in the mighty central Puget Sound region to employment centers in Seattle, Bellevue, Renton and SeaTac. Everett and Tacoma also serve as major employment centers. Figures 3 and 4 present the baseline growth in transit trips for the region across key screenlines.

Figure 3 - Growth In Transit Trips: 2004 - 2030 at Selected Screenlines

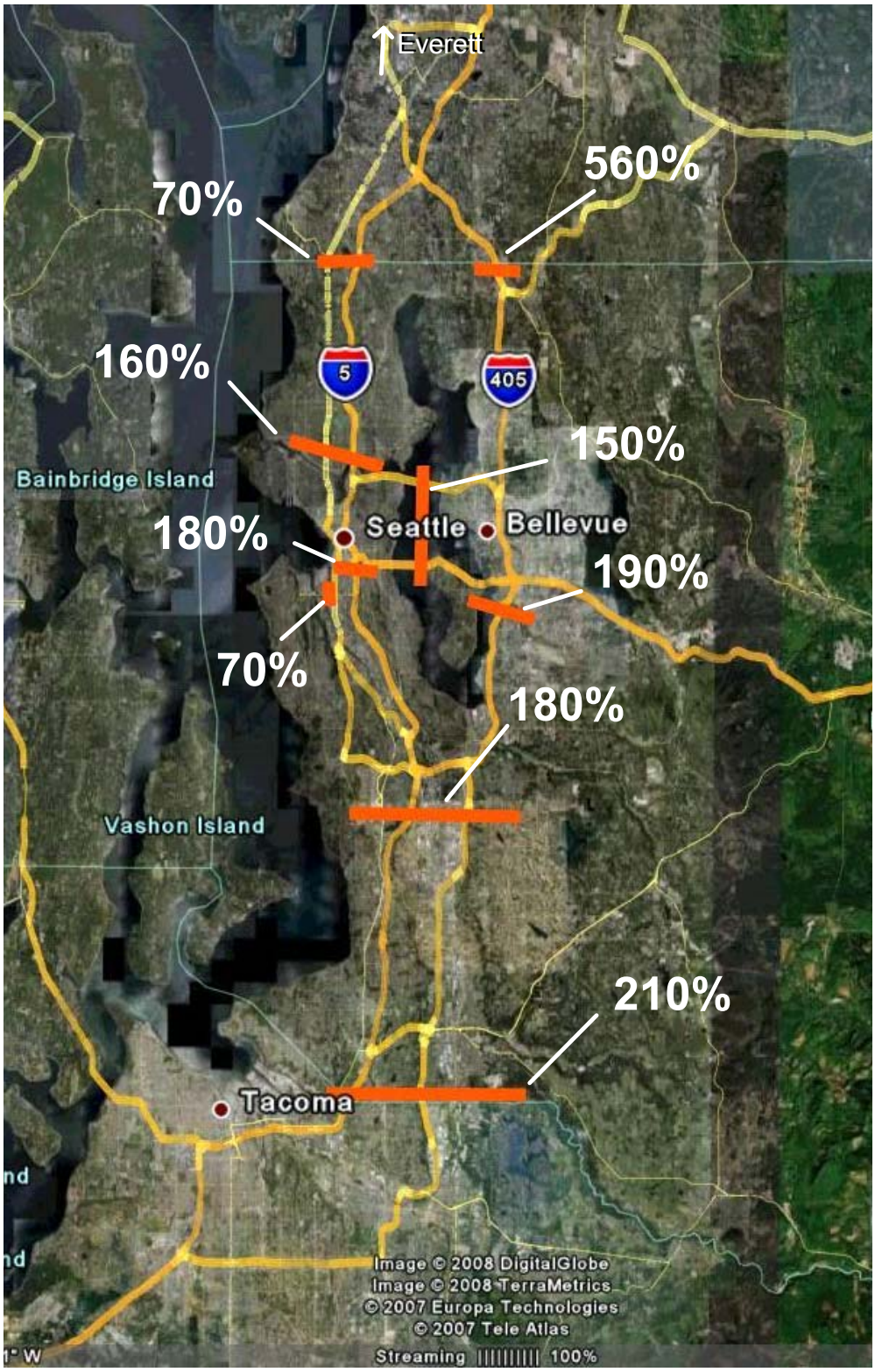


Figure 4 - 2030 Baseline Daily Transit Demand at Selected Screenlines

Source: Sound Transit Ridership Forecasting Model, as reported in Regional Transit Long-Range Plan Draft SEIS, 2004

The growth in transit demand and the absolute levels shown in Figures 3 and 4 above are primarily the result of development patterns that are occurring now and expected to continue through 2030. The increasingly dense housing and employment activity centers in Seattle CBD, Northgate, University, and Bellevue, drive the level and patterns of transit demand. The PSRC High Capacity Transit Corridor Assessment identified land use density as a primary indicator for determining whether a geographic area can support high capacity transit. A range of 30-45 residents and jobs per gross acre is considered to support High Capacity Transit (HCT) in the future. Densities that exceed 45 people and jobs per gross acre were considered to be highly supportive of HCT.

Table 8 – Land Use Density

Center	Jobs+Population Density (People + Jobs)/Gross Acre
Seattle CBD	210
Bellevue	80
1st Hill/Capitol Hill	75
Uptown	70
University	70
Overlake	65
Northgate	35
Renton	35
Everett	35
Tacoma Downtown	30
Tukwila	30
Federal Way	20
Tacoma Mall	19
Redmond	17
Totem Lake	17
Lynnwood	17
Lakewood	15
SeaTac	14
Issaquah	10
Paine Field	9
Canyon Park	6
Port of Tacoma	3
DuPont	2

Based on the land use patterns and ridership forecasted travel demand, the PSRC High Capacity Transit Corridor Assessment identified the following as near-term implementation goals for HCT: Seattle – Northgate, Seattle – Bellevue, Seattle – SeaTac.

5. Congestion

Growth in population and employment, reduction in King County housing affordability and the resulting long-distance county-to-county commuter patterns are continuing to make traffic congestion worsen in the region. WSDOT defines congestion as the occurrence of speed falling below 70% of the posted speed limit. Currently, maximum traffic throughput is achieved on a typical freeway segment in the central Puget Sound region at about 51 mph (roughly 85% of the posted speed limits). When speeds fall below 70% of posted speed, or about 40 mph, the highway has lost efficiency to the level of significant congestion. Below 35 mph, the road operates in a severely congested manner. The following table presents WSDOT thresholds for congestion.

Table 9 – Congestion Thresholds

WSDOT's Congestion Measurement Thresholds		
Condition	**Highway Speed Range**	**Description**
Posted Speeds	52 mph or above (Posted Speed)	Highway is at less than maximum productivity because drivers are at greater than optimal spacing
Maximum Throughput	51 mph-41 mph (about 85%-70% of Posted Speed)	Highway is working at maximum productivity
Congestion	40 mph (below 70% of Posted Speed)	Highway is at less than maximum productivity because drivers are at less than optimal spacing
Severe Congestion	35 mph or below (about 60% of posted speeds)	Highway is well below maximum productivity

WSDOT uses peak period travel time and a measure called "95% Reliable Travel Time" to quantify the levels of congestion throughout the region. In general, roadways that are over or near capacity have greater difficulty recovering from incidents. As a result the reliability of the roadways goes down as they reach capacity and the impact of incidents on traffic flow and delay are magnified. As a general pattern, the central Puget Sound region roadways typically have average peak period travel times that are significantly higher than what could be achieved on an uncongested roadway. Likewise, to ensure that one reaches a desired destination on time it is necessary to leave much earlier to account for the impact of regular incidents on traffic flow. The following table presents the levels of congestion that currently exist on the primary commute routes in the central Puget Sound, and shows how much travel time the region's citizens have to allow in order to reach their destinations "on-time" 95% of the time.

Table 10 - EVENING: **Key Commute Routes: Travel Time Performance**

Route	Route Description	Length (miles)	Travel Time At Posted Speeds (minutes)	Average Peak Travel Time (minutes)	95% Reliable Travel Time (minutes)	Average Peak Period Speed (mph)
From Seattle						
I-5	Seattle to Everett	23.7	24	46	68	31
I-5	Seattle to Federal Way	22.1	22	37	55	36
I-5/I-90	Seattle to Issaquah	15.7	16	24	36	39
I-5/SR 520	Seattle to Redmond	14.7	16	30	43	29
I-5	Seattle to SeaTac	12.9	13	19	26	41
I-5/I-90/I-405	Seattle to Bellevue	10.6	11	18	31	35
I-5/SR 520/I-405	Seattle to Bellevue	10.1	11	21	33	29
From Bellevue						
I-405	Bellevue to Bothell	16.0	16	31	44	31
I-405	Bellevue to Tukwila	13.5	13	32	44	25
I-405/I-90/I-5	Bellevue to Seattle	10.7	11	26	41	25
I-405/SR 520/I-5	Bellevue to Seattle	10.5	11	28	37	23
I-405/I-90	Bellevue to Issaquah	9.3	9	18	23	31
I-405/SR 520	Bellevue to Redmond	6.8	8	14	22	29
From Others						
I-5	Everett to Seattle	23.7	24	40	56	36
I-90/I-5	Issaquah to Seattle	15.5	15	26	45	36
SR 520/I-5	Redmond to Seattle	14.8	16	37	61	24
SR 167	Renton to Auburn	9.8	10	18	33	33

Note: data for Snohomish and Pierce counties were not reported.

The recently conducted performance audit of the WSDOT conducted in October 2007 concluded the following regarding congestion:

"Congestion is a significant problem in the Puget Sound Region and in the City of Seattle in. In 2006, 42 percent of the time in the morning peak period (6 a.m. to 9 a.m.) commuters travel at speeds less than 45 miles per hour on the Region's major freeways. Afternoon peak period speeds fall below 25 miles per hour 11 percent of the time and below 45 miles per hour 48 percent of the time. WSDOT estimates delays totaled more than 256,000 hours a day in 2005. Traffic incidents and construction only add to rush hour problems. .... Between 2003 and 2005, travel times increased by 28 percent on major commuter routes. In addition, system reliability degraded. The 95 percent reliable travel time — the time it takes to arrive on time 19 out of 20 days — requires peak-hour travelers to leave a margin equal to almost three times the free flow travel time. Between 2004 and 2005, this safety margin increased by between 8 percent and 35 percent on most commuter routes. As a result, commuters must continue to leave home earlier in the morning in order to get to work on time. Some roadway segments show much worse conditions."

One of the key benefits from HCT identified in the early planning for Sound Transit was the ability for transit operating in separate, exclusive rights-of-way to avoid recurring and intermittent congestion present on central Puget Sound highways and arterials. For example, over the entire year 2007 the ST *Sounder* commuter rail system operated at greater than 98% reliability, with reliability defined as reaching the terminal within 7 minutes of the scheduled arrival time.